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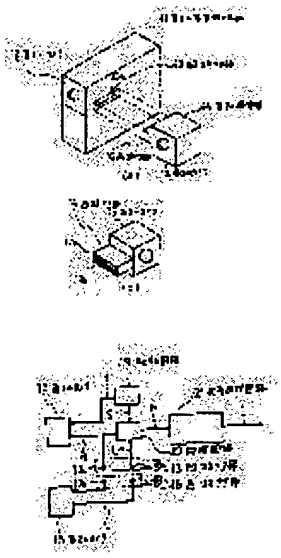
(54) STEREOSCOPIC IMAGE PICKUP DEVICE



(57)Abstract:

PURPOSE: To facilitate stereoscopic picking-up of an image by using a first image pickup part to execute single-lens pickup, and connecting a second image pickup part to the first image pickup part at the time of stereoscopic image pickup.

CONSTITUTION: At the time of using a first camera 12 only, the second image pickup part 14 is dismounted from the first image pickup part main body 11, and an image is picked up by the first camera 12 based on a drive pulse (f) from a drive circuit 19 to generate a video output signal R which undergoes a switching circuit 20 and is processed in a signal processing circuit 21, thus the signal is outputted as a video signal (i). At the time of executing the stereoscopic image pickup, a projection connector part 16 is inserted to a recessed connector part 13, then, connection terminals 17a and 17b, and those 18a and 18b are respectively connected with each other. Accordingly, a pulse (f) from the circuit 19 is supplied to both the first and the second cameras 12, 15, and the cameras 12, 15 pick up image similarly, and the camera 15 outputs a video signal L synchronized with a video output signal R from the camera 12. Thereafter, based on a control signal (g) from the circuit 19, signals R, L are alternately outputted in the unit of everyone field from the switching circuit 20 to obtain a desired image.

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審査請求　未請求　発明の数 1　（全4頁）

⑤4発明の名称　立体撮像装置

⑳特　願　昭62－160902
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明　細　書

1．発明の名称

立体撮像装置

2．特許請求の範囲

(1) 撮像用の駆動信号および映像信号切換用の制御信号を発する駆動回路と、前記駆動回路の駆動信号に基づいて撮像を行う第1のカメラと、前記駆動回路の駆動信号を外部に導出するとともに外部からの映像信号を導入するための第1のコネクタと、前記第1のカメラの映像出力信号と第1のコネクタから導入される外部映像信号とを前記駆動回路の制御信号に基づいて所定のタイミングで切換える切換回路とを具備した構成の第1の撮像部と、

第2のカメラと、前記駆動回路の駆動信号を導入するとともに第2のカメラの映像出力信号を導出するための第2のコネクタとを備え、且つ前記第1の撮像部に対して第1及び第2のコネクタを介して着脱可能に結合される第2の撮像部とを備えたことを特徴とする立体撮像装置。

(2) 前記切換回路は、第1のカメラの映像出力信号と第1のコネクタから導入される外部映像信号とを1フィールド毎に交互に切換えて出力することを特徴とする特許請求の範囲第1項記載の立体撮像装置。

(3) 前記第2の撮像部は、第1の撮像部に対して光軸の垂直方向は同一角度に、光軸の水平方向は平向又は所定角度ずれて結合されることを特徴とする特許請求の範囲第1項又は第2項の記載の立体撮像装置。

3．発明の詳細な説明

〔発明の目的〕

（産業上の利用分野）

本発明は立体撮像装置に関する。

（従来の技術）

従来、時分割方式の立体ビデオカメラは例えば第4図、第5図に示すように構成されていた。第4図は外観を示しており、右視カメラ1_R、左視カメラ1_Lおよび信号処理部2が一体に構成されている。第5図はブロック図であり、右視カメ

ラ1_R；左視カメラ1_Lは駆動回路3から発せられる駆動パルスaによって撮像を行う。前記カメラ1_R、1_Lの映像出力信号R，Lはスイッチ4に導かれ、駆動回路3から供給されるフィールドインデクス（制御信号）bに基づいてフィールド順に切換えられて出力される。5はスイッチ4から導かれるフィールド順次信号Cを処理して立体ビデオ信号dを出力する信号処理回路である。また、単眼の映像、すなわち右視か左視のどちらかの映像を得る場合は、スイッチ4に制御信号eを与えることにより選択することができる。

上記のように構成された装置は、単眼撮像（例えば右視カメラ1_Rのみ使用）の場合でも、常に第4図のように右視カメラ1_Rおよび左視カメラ1_Lを取り付けた状態で使用しなければならないという問題点があった。

（発明が解決しようとする問題点）

本発明は上記の点に鑑みてなされたものでその目的は、立体撮影のときは双眼のカメラとなり、単眼撮影のときは単眼のカメラのみとなりうる立体撮像装置を提供することにある。

［発明の構成］

（問題点を解決するための手段）

本発明は、撮像用の駆動信号および映像信号切換用の制御信号を発する駆動回路と、前記駆動回路の駆動信号に基づいて撮像を行う第1のカメラと、前記駆動回路の駆動信号を外部に導出するとともに外部からの映像信号を導入するための第1のコネクタと、前記第1のカメラの映像出力信号と第1のコネクタから導入される外部映像信号とを前記駆動回路の制御信号に基づいて所定のタイミングで切換える切換回路とを具備した構成の第1の撮像部と、

第2のカメラと、前記駆動回路の駆動信号を導入するとともに第2のカメラの映像出力信号を導出するための第2のコネクタとを備え、且つ前記第1の撮像部に対して第1及び第2コネクタを介して着脱可能に結合される第2の撮像部とを備えたことを特徴としている。

（作用）

第2の撮像部を取り付けずに第1の撮像部のみによって撮影すると、第1のカメラの映像出力信号のみが切換回路を通過し単眼撮影の映像信号として出力される。

また、立体撮影を行う場合は、第1のコネクタと第2のコネクタとを結合すれば第1および第2の撮像部は電気的に接続されるとともに機械的に結合状態となる。このため第1および第2のカメラは駆動回路の駆動信号によって撮像を行い、該映像出力信号はともに切換回路に供給される。切換回路は駆動回路の制御信号に基づいて、第1のカメラの映像出力信号と第2のカメラの映像出力信号とを所定のタイミング、例えば1フィールド毎に交互に切換えて出力する。

（実施例）

以下、図面を参照しながら本発明の一実施例を説明する。第1図(a)は全体構成の外観を示しており、11は第1の撮像部の本体である。この本体11には第1のカメラ12、凹コネクタ部13および後術する駆動回路、切換回路、信号処理回路（図示省略）が設けられている。14は第2のカメラ15と凸コネクタ部16とを有する第2の撮像部である。第2の撮像部14の凸コネクタ部16には、第1図(b)に示すように第2のカメラ15に駆動パルスを導くための接続端子17b と第2のカメラ15の映像出力信号を導出するための接続端子18b とが設けられている。尚、第1図(a)の凹コネクタ部13には図示を省略しているが駆動回路の駆動パルスを導出するための接続端子(17a) と切換回路に映像信号を導くための接続端子(18a) とが設けられている。このため凸コネクタ部16を凹コネクタ部13に挿入すれば、第1の撮像部の本体11と第2の撮像部14は機械的に結合されるとともに、電気的にも接続端子17a，18a と接続端子17b，18b とが接続状態にされる。また、凹コネクタ部13は凸コネクタ部16を挿入したときに、第1図(c)に示すように第1のカメラ12と第2のカメラ15の向く角度がθずれるように設けられている（すなわち第1のカメラ12の光軸と第2のカメラ15の光軸の水平方向の角度がθである）。前記角度θは、第1

図(c)のように第1および第2のカメラ12，15の方向が前方のある一点で交叉するような角度に限らず、第1および第2のカメラの方向が平行になるようにしても良い。また、凹コネクタ部13は、凸コネクタ部16を挿入したときに第1および第2のカメラ12，15の光軸の垂直方向の角度が一致するように設けられている。第2図は実施例の電気的ブロック図であり、19は第1のカメラ12および凹コネクタ部13の接続端子17a に駆動パルスfを供給するとともに、切換回路20に制御信号gを供給する駆動回路である。切換回路20は第1のカメラ12の映像出力信号Rと凹コネクタ部13の接続端子18a から導かれる映像信号Lとを駆動回路19の制御信号gに基づいて切換える。21は切換回路20から出力される映像信号hの処理を行ってビデオ信号iを出力する信号処理回路である。

上記のように構成された装置において、第1のカメラ12のみを使用する場合は、第2の撮像部14を第1の撮像部の本体11から離脱させておく。すると駆動回路19の駆動パルスfに基づいて撮影された第1のカメラの映像出力信号Rは、切換回路20を通過して信号処理回路21で処理され、ビデオ信号iとして出力される。

また、立体撮影を行うときは凹コネクタ部13に凸コネクタ部16を挿入すれば接続端子17a と17b が、接続端子18a と18b が各々接続状態となる。このため駆動回路19の駆動パルスfは第1および第2のカメラ12，15にともに供給されるので、第2のカメラ15は第1のカメラ12と同様に撮影を行う。そして第2のカメラ15は第1のカメラ12の映像出力信号Rに同期した映像信号Lを出力し、該映像信号R，Lは切換回路20に導かれる。このとき切換回路20は駆動回路19の制御信号gに基づいて前記映像信号R，Lを1フィールド毎に交互に切換えを行う。このため第1および第2のカメラ12，15の映像信号R，Lは第3図の下側に示すようにフィールド順に交互に切換えられて切換回路20から出力される。尚第3図の上側は第1のカメラ12のみによる撮影時の映像信号Rの順序を示している。

［発明の効果］

以上のように本発明によれば、単眼撮像を行うには第1の撮像部のみを使用すれば良く、立体撮像を行うには第1の撮像部と第2の撮像部を結合させれば良い。しかも第1および第2撮像部の着脱は極めて容易であり、撮像部の固定と電気的接続は第2のコネクタと第1のコネクタとを結合するだけでワンタッチで行える。

4．図面の簡単な説明

第1図は本発明の一実施例を示し、第1図(a)は外観斜視図、第1図(b)は要部斜視図、第1図(c)は結合状態を示す図、第2図は電気回路のブロック図、第3図は第2図の切換回路20の入力と出力の関係を示す図、第4図は従来の立体撮像装置の一例を示す外観斜視図、第5図は第4図の装置の電気回路のブロック図である。

11…第1の撮像部の本体
12…第1のカメラ
13…凹コネクタ部
14…第2の撮像部
15…第2のカメラ
16…凸コネクタ部
19…駆動回路
20…切換回路
21…信号処理回路

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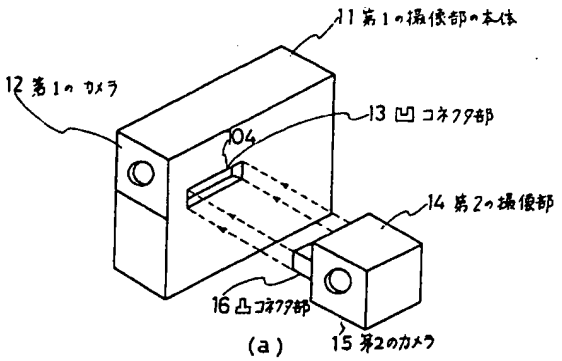
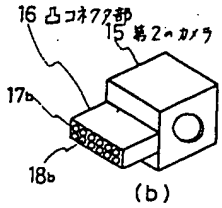
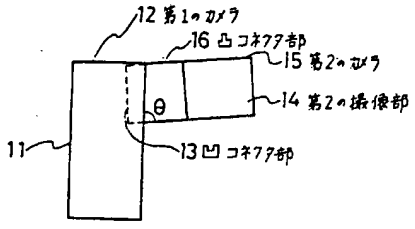
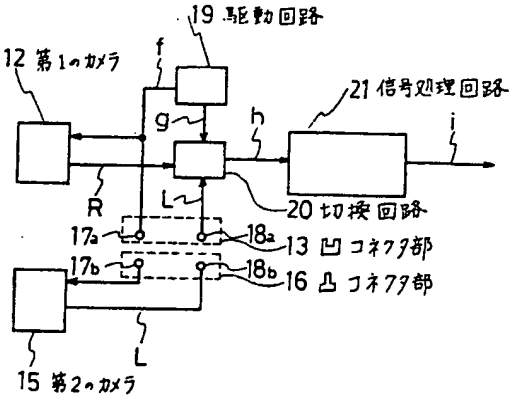


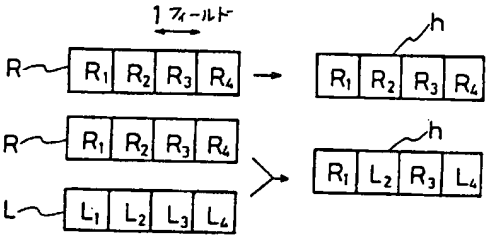




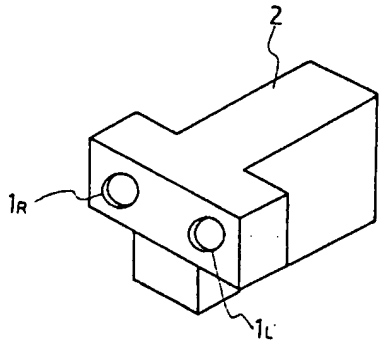
第 1 図



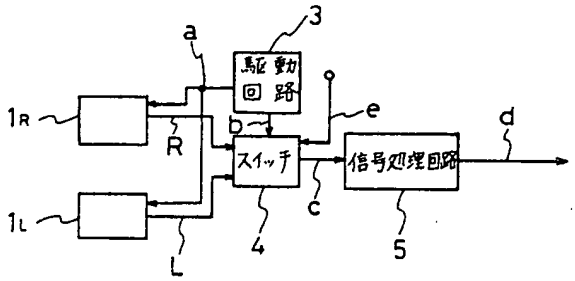
第 2 図



第 3 図



第 4 図



第 5 図

PTO 01-[PTO 2005 3832]<-(Showa 64 7794)(origin of patent)-> Japan Patent

(Number of Document)->total of 5 pages

STEREOSCOPIC IMAGE PICK-UP DEVICE

Author (Noriu Norichika)

UNITED STATES PATENT AND TRADEMARK OFFICE

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Applicant	:	Toshiba Corp.
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English Title	:	STEREOSCOPIC IMAGE PICKUP DEVICE

Specification

1. Title of the invention

STEREOSCOPIC IMAGE PICKUP DEVICE

2. Scope of the patent claim

It is a stereoscopic image pickup device characterized as being equipped with the first image pickup part and the second image pickup part wherein the first image pickup part is structured to be equipped with a drive circuit which generates control signals for projected image signal switching, and drive signals for image pickup, the first camera which executes image pickup based on the drive signals of aforementioned drive circuit, the first connector to derive the drive signals of aforementioned drive circuit to an external part and at the same time to introduce projected image signals from the external part, the switching circuit which switches projected image output signals of the aforementioned first camera and the external part projected image signals introduced from the first connector by a specified timing based on the control signals of aforementioned drive circuit;

The second image pickup part is equipped with the second camera, and the second connector in order to introduce the drive signal of aforementioned drive circuit and at the same time to derive the projected image output signal of the second camera, and also the second image pickup part to be also connected, attachable and

removable via the first and second connector vis-à-vis the first image pickup part.

(2) Stereoscopic image pickup device described in the claim one of the scope of the patent claim is characterized such that aforementioned switching circuit executes outputting by alternatively switching at every one field the projected image output signals of the first camera and the external part projected image signals introduced from the first connector.

(3) Stereoscopic image pickup device described in the claim one or claim two of the scope of the patent claim is characterized such that regarding aforementioned second image pickup part, against the first image pickup part, the vertical direction of optical axis is connected at the same angle and the horizontal direction of the optical axis is connected parallel or shifted at the specified angle.

3. Detailed explanation of the invention

[Purpose of the invention]

(Utilized field in industry)

This invention relates to a stereoscopic image pickup device.

(Prior arts)

Traditionally, Stereoscopic video cameras of time division method were, for instance, structured as shown in figure 4 and figure 5. Figure 4 shows the external appearance, and left vision camera 1R, left vision camera 1L and signal processing part 2 are

configured as a unit. Figure 5 is a block drawing, and left vision camera 1R, left vision camera 1L executes the image pickup by the drive pulse "a" emitted from drive circuit 3. Projected image output signals R, L of aforementioned camera 1R, 1L are switched by field sequence based on the field index b (control signal) supplied from drive circuit 3, and outputted. 5 is a signal processing circuit wherein field sequence signal c guided from switch 4 is processed and outputs the stereoscopic video signal d. In case single lens projected image, that is, a projected image of either one of left vision or left vision is obtained, the selection is executed by providing control signal e to switch 4.

Regarding the device with above described structure, the problem was that even in case single lens image pickup (for instance, only left vision camera 1R is used), as in figure 4, it had to be used in the condition where left vision camera 1R and left vision camera 1L are mounted always.

(The problem this invention attempts to solve)

This invention was done in view of the above points, and the purpose is to provide stereoscopic image pickup device wherein at the time of stereoscopic image pickup, it becomes two lens cameras, and at the time of one lens image pickup, it can become single lens camera.

[Structure of the invention]

(The mechanism to solve the problems)

This invention is characterized as being equipped with the first image pickup part and the second image pickup part wherein the first image pickup part is structured to be equipped with a drive circuit which generates control signals for projected image signal switching, and drive signals for image pickup, the first camera which executes image pickup based on the drive signals of aforementioned drive circuit, the first connector to derive the drive signals of aforementioned drive circuit to an external part and at the same time to introduce projected image signals from the external part, switching circuit which switches projected image output signals of the aforementioned first camera and the external part projected image signals introduced from the first connector by a specified timing based on the control signals of aforementioned drive circuit;

The second image pickup part is equipped with the second camera, and the second connector in order to introduce the drive signal of aforementioned drive circuit and at the same time to derive the projected image output signal of the second camera, and also the second image pickup part to be also connected, attachable and removable via the first and second connector vis-à-vis the first image pickup part.

(Operation)

If a picture is taken using only the first image pickup part without attaching the second image pickup part, only the projected image output signals of the first camera pass through the switching circuit, and is outputted as the projected image signals of single lens shooting.

And in case stereoscopic shooting is done, if the first connector and second connector are connected, the first image pickup part and second image pickup part are connected electrically, and also, is placed in the connected condition mechanically. Due to this, the first and second cameras executes image pickup by the drive signals of drive circuit, and said image pickup output signals are both supplied into switching circuit. Switching circuit, based on the control signals of drive circuit, alternatively switches at a specified timing, for instance, at every one field, the projected image output signals of the first camera and projected image output signals of the second camera and outputs them.

(Embodied examples)

In the following, while referring to the drawings, one example of the embodied case of this invention will be explained. Figure 1(a) shows the external appearance of the entire structure, and 11 is the main body of the first image pickup part. In this main body 11 are set up the first camera 12, concave connector part 13, and what is later described, that is, drive circuit, switching circuit,

signal processing circuits (not shown here). 14 is the second image pickup part equipped with the second camera 15 and convex connector part 16. In the concave connector part 16 of the second image pickup part 14, as shown in figure 1(b), are set up the connection terminal 17b to guide the drive pulse to the second camera 15, and connection terminal 18b to derive the projected image output signal of the second camera15. And, in the concave connector part 13 in figure 1(a), although not shown in the drawing, are set up the connection terminal (17a) to derive the drive pulse of the drive circuit, and connection terminal (18a) to guide the projected image signals to switching circuit. Because of this, if convex connector part 16 is inserted into concave connector part 13, main body 11 of the first image pickup part, and the second image pickup part 14 are mechanically joined, and also electrically, connection terminal 17a, 18a, and connection terminal 17b, 18b are placed in a connected condition. And, when concave connector part 13 is inserted into convex connector part 16, as shown in figure 1(c), it is set up such that the angle of facing the first camera and the second camera is shifted at θ. (that is, the angle of the horizontal directions of the optical axis of the first camera and that of the second camera is θ). The aforementioned angle θ, as shown in figure 1(c), is not limited to the angle wherein the directions of first and second camera 12, 15 are intersected at a point in front, but it is acceptable if the directions of first and second camera become parallel. And, as to

concave connector part 13, when convex connector part 16 is inserted, it is set up such that the angle of vertical directions of the optical axes of the first and second camera 12, 15 match. Figure 2 is an electrical block drawing of an embodied example, and 19 is the drive circuit which supplies drive pulses to the connection terminal 17a of the concave connector part 13 and the first camera 12, and at the same time, supplies control signals to switching circuit 20. Switching circuit 20 switches projected image output signals R of the first camera 12 and projected image pickup signals L guided from the connection terminal 18a of the concave connection part 13, based on the control signal of the drive circuit 19. 21 is the signal processing circuit wherein projected image signal h outputted from switching circuit 20 is processed and video signal I is outputted.

In the device with above described structure, in case only the first camera 12 is used, the second image pickup part 14 is kept removed from the main body 11 of the first image pickup part. Then, as to the projected image output signals R of the first camera photographed based on the drive pulse f of the drive circuit 19, it goes through the switching circuit 20, and is processed at signal processing circuit 21, and is output as video signal i.

And, when stereoscopic shooting is done, if convex connector part 16 is inserted into concave connector part 13, connection terminal 17a and 17b, connection terminal 18a, and 18b are placed respectively into a connected state. Because of this, drive pulse

f of drive circuit 19 are supplied to both first and second camera 12, 15, hence, the second camera 15 executes the photographing same as the first camera 12. And, second camera 15 outputs the projected image signal L which is synchronous with the projected image, output signals R of the first camera, and said projected image signal R, L are guided to switching circuit 20. At this time, switching circuit 20, based on the control signal of the drive circuit 19, alternatively switches the aforementioned projected image signal R, L at every one field. Because of this, projected image R, L of the fist and second camera, as shown in the lower side of figure 3, are alternatively switched by each field sequence, and is outputted from switching circuit 20. The upper side of the figure 3 shows the sequence of the projected image signals R at the photographing time only by the first camera.

[Effect of the invention]

As described above, according to this invention, in order to execute single lens image pickup, one can use only the first image pickup part, and in order to execute the stereoscopic image pickup, one can connect the first image pickup part and second image pickup part.

In addition, the attachment and removal of the first image pickup part and second image pickup part is quite easy, and the fixing of image pickup part and electrical connection can be done by one touch by connecting the second connector and the first connector.

3. Simple explanation of the drawing

Figure 1 shows an embodied example of this invention, figure 1(a) is an external appearance three dimensional drawing, figure 1(b) a three dimensional drawing of the main part; figure 1(c) is a drawing showing the connected condition; figure 2 is a block drawing of the electrical circuit; figure 3 is a drawing showing the relationship between the input and output of switching circuit 20 of the figure 2; figure 4 is a three dimensitional drawing of the external appearance showing an example of a traditional stereoscopic image pickup device; figure 5 is a block drawing of the electrical circuit of the device in figure 4.

11.. the main body of the first image pickup part

12.. first camera

13 concave connector part

14.. the second image pickup part

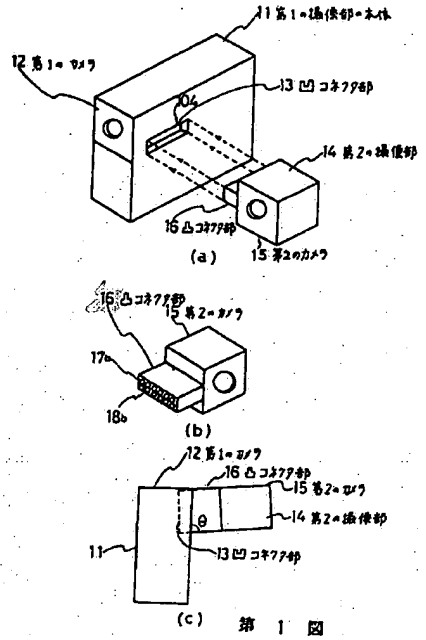
15.. second camera

16.. convex connector part

19.. drive circuit

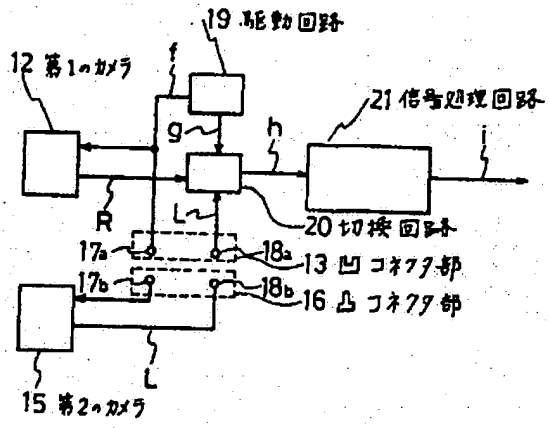
20.. switching circuit

21 signal processing circuit



第 1 図

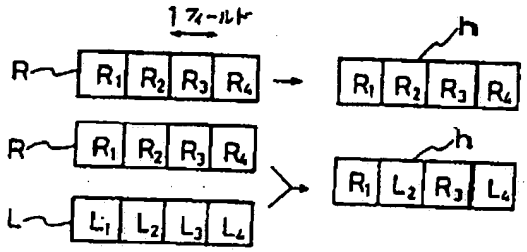
Figure 1



第 2 図

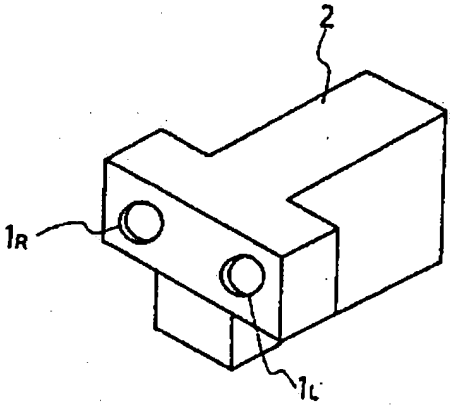
Figure 2

One field (*right and left arrow*)



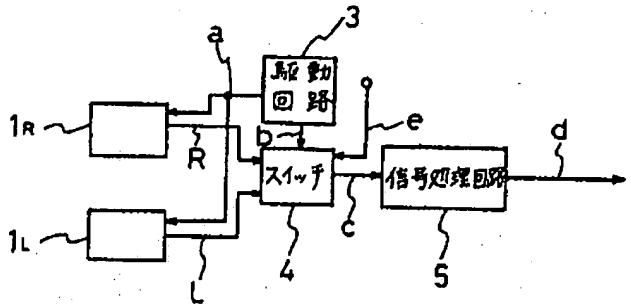
第 3 図

Figure 3



第 4 図

Figure 4



第 5 図

Figure 5